



ON THE STATE OF THERAPEUTICS IN TETANUS.

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THE ancient treatment of tetanus was only palliative, and it was unsuccessful; so that the old writers, who give the first place to the common method of alleviating pain, bring up afterwards the drugs that they knew to act on the nervous system very much, with the honest courage of men who are not ashamed of showing all their strength when it is most overmatched. "Nor yet," says one of them, "can the physician standing by and looking on be now of any service to his patient to rescue him either from death or from pain, or from the shameful contortions of his disease. No longer of any assistance, he can only be sorry for him, as he sees him overcome."

Modern medicine, in despair for a specific, forgets that she is armed with a sheaf of weapons that would have made the ancients contented. In the attempt to cure we have arrived at alleviation, and at such complete alleviation as often to bring cure with it; and if we have accomplished nothing more, yet the step already made must encourage the highest hope. And that nothing more has been accomplished, a consideration of what has been done in different instances by these drugs will show.

To begin with chloroform. Certainly if tetanus were curable by chloroform we should all know it: its general use has ensured it a wide trial, and from the ease and quickness with which it can be introduced into the system, its effects are at first sight most brilliant, nor need it always, in order to relieve the muscular contraction and spasm, be pushed to narcotism. Under

its influence the respiration becomes regular, the pulse infrequent, soft, and full, and this without giddiness, headache, or distress: it is even possible to feed the patient. Thus, Simpson narcotised a child for thirteen consecutive days, using ℥100 with success. But the general result is, that while all the fatal symptoms disappear upon the inhalation of chloroform, they return at its removal with unabated violence, and the disease generally comes then to its fatal conclusion without delay. A very good illustration of this may be found in a case reported by Dr. Panthel of Limburg, who used on the first day ℥vj. of chloroform without inconvenience, and yet after the most complete remission of all symptoms, in the end lost his patient, who died with a small, hard, and rapid pulse, inhaling chloroform and conscious.

Chloroform is now very rarely administered in tetanus, but chloral hydrate and calabar bean, the drugs which most nearly approach it in respect of physiological action, are much in favour. Innumerable cases of the action of chloral are reported. To make any digest of them would be impossible, but in reading them one becomes convinced of two facts:—the first, that large doses must be given, and may be given without fear; the second, that such a treatment is most valuable. In the *Progrès Méd.* of July, 1875, there is a successful case reported in which the character of the disease was almost masked by the treatment, which was of a decidedly heroic nature, the daily dose of chloral being 155 grains, and intoxication being well marked. In the same paper reference is made to cases of death from overdose of chloral, which however are declared to be rare, and as an indication of the quantity that may be given the case is quoted of a child of twelve and a half years who took more than 200 grains a day. Dr. Ballantyne, of Dalkeith, gave ℥iij. in twenty-four hours, and ℥vj. ss. in three weeks with success; the patient during this time being easily aroused to speak. Other and similar cases are well known; unsuccessful ones will be found in *Bull. Gén. de Thérap.*, June, 1874, and in 1875 Alphonse Deu in a traumatic case gave as much as 150 grains a day without good result.

In 1872 chloral was injected into the veins by Dr. Oré, who, though unsuccessful, vaunted his method. In 1874 it was tried by Cruveilhier (*Gazette des Hôp.*, No. 49), who also failed, and

recommended that a solution containing one-fifth in place of one-third should be used. Later on in the same year Lannelongue (*Gaz. des Hôp.* No. 125), using one-fifth, practised with the same result, and in the *post-mortem* examination found thromboses in the injected veins and clots in the right heart. In 1874 the Medical Theatre at Paris rang with denunciations of Dr. Oré, whose method died finally on May 13, 1874, in the presence of the Surgical Society of Paris, defended by its author to the last. It appears that in the subcutaneous injection of chloral, which has also been practised, a strength exceeding one-third injures the skin.

Calabar bean, which, like chloral, affects the spinal cord, and has little or no action on the motor and sensory nerves, has also, like chloral, a high and well-deserved reputation. Eilert in 1873 (*Zur Frage von der Behandlung des Wundstarrkrampfes*) pretends that of opium, chloroform, chloral, curare and Calabar bean, the latter is the only one that acts satisfactorily on the spinal cord. He recommends either previous narcotism by chloral, or the simultaneous administration of atropin, so that both of these combinations have probably been tried. Already in 1864 Holthouse had reported two cases in the *Lancet*, one successful; he used three grains of the extract every two hours, and once $4\frac{1}{2}$ grains in one dose. Maunder added two unsuccessful cases, and in 1867 Dr. Eben Watson reported two traumatic cases, which recovered, in the *Edin. Med. Journ.*; he had given by accident nine grains in as many hours. He also narrates his experience of the bean in Calabar, and gives ten experiments on animals; later he reported six of eight cases successful. Dr. Fraser in 1868 (*Practitioner*), urging the trial of the bean, which has since been largely used, gives a history of its use, with a list of cases. But Mr. Ashdown (*Brit. Med. Journ.*) in the same year had a case in which the drug seemed to fail, and Professor Spence, in the *Lancet* of January, 1875, reported another unsuccessful case, in which a boy of eighteen took twenty-two grains of the extract in $3\frac{1}{2}$ days, and died on the fourth day. In last year's *Lancet* there are three cases by Dr. Dickenson, one of which died after having had about seven grains of the extract injected subcutaneously in the course of an afternoon without cessation of the spasms being procured: while of the two successful

cases one was of an idiopathic, and the other a protracted nature.

The effect of the bean seems to be all that one would expect from its known properties; and that it is indicated the large doses requisite to obtain its physiological action seem to prove. The spasms are controlled and the body heat sinks, and if the drug be withheld the paroxysms return, while if it be pressed the patient comes into a somewhat dangerous condition. Those who have used it recommend its hypodermic injection, not less than $\frac{1}{3}$ grain of the extract every two hours, and so large a dose is required to procure contraction of the pupil that it has even been seriously contended that its effect in subcutaneous injection is to dilate it. From the reported cases it seems as if the first injection of Calabar bean or of curare sometimes produced a spasm.

Opium combined with chloral has been often successful. In 1874 Delsol reported three cases out of four saved by this plan; but in most of the printed cases the chloral is given in such predominance as to claim more than half the merit of the cure. A fatal case will be found in *Progrès Méd.*, July, 1875. Alcoholic cases have been treated successfully by opium alone; and that the drug is not contra-indicated may be learned from Dr. Avemollo, who in *L'Imparziale* (Florence) of December, 1868, is said to have given successfully in the course of eleven days eighty-five grains of the extract and one ounce of the tincture of opium, and five grains of acetate of morphia, besides vast quantities of belladonna, assafetida, hyoseyanus, and camphor.

Nitrite of amyl, which, like the three first-mentioned drugs, lessens the reflex action of the spinal cord, and has no action on the motor and sensory nerves, but, unlike them, excites the circulation, has been tried and failed. The first reported cases were of course the successful ones, Mr. Foster in the *Lancet*, April, 1870, and another in the *Berlin. klin. Wochenschrift* of January, 1875. But, in 1874, Forbes (*Philad. Med. and Surg. Rep.*) reports that the attacks were only rendered milder by the medicine, and returned severely on leaving it off; and the *British Med. Jour.* of the same year contains a fatal case.

Bromide of potassium, combined with chloral, was used successfully by both Drs. Panthel and Carruthers in 1874, but the

chloral was given in large doses. In Carruthers' case a boy took 1,140 grains of chloral in sixteen days, and subsequently had a sort of *mania a potu*. It seems doubtful whether the administration of bromide of potassium alone has ever been successful in severe cases. Robert Brown has a case in which he gave 20 grains hourly for fourteen days, but was not able to prevent the spasms, while stiffness of the muscles continued long into convalescence; and a case is to be found in the *Prog. Med.*, July, 1875, which ended fatally, notwithstanding that the patient took 150 grains a day.

Of conium, the action of which is said to be confined to the spinal cord and motor nerves, no results worthy of such premises are found. The cases in which it has seemed successful have been slight ones, and the drug appears to be inert even in large quantities.

Of aconite some very remarkable results have been given. The first instance of its use occurs in 1846, in a case of Mr. Page (*Lancet*, April 4). This case, which is well known, was traumatic; there was a remission of all symptoms after a three-minim dose, then recurrence of symptoms, and with the repetition of the medicine chilliness, cold skin, and clammy sweat; pulse 120, weak and intermittent. The antidotes used were wine and opium. The treatment seemed to consist in a balancing of the patient between tetanus and syncope. Then in 1859 Campbell de Morgan had a successful case, not a very severe one. The patient took ℥iij. of the pharmacopœial, and ℥v. of Fleming's tincture, that is, about ℥xiiij. of B.P. strength, without damage; and in 1860 a case in the *Brit. Med. Journ.* confirms the other two. Aconite when administered in tetanus will lower the pulse, which fell in one case from 135 to 60, and simultaneously the convulsions decrease, and the muscular contractions are relaxed; but the effects of the drug constitute in themselves a new danger, which must be carefully and skilfully controlled. The wakefulness is increased; there is vertigo with confusion of ideas; the pupil, which is widely dilated, becomes insensible; and the pulse small, intermittent, and irregular. In one case the state of the patient was such that the slightest jar set up spasm, similar to that in strychnia poisoning. On the whole these cases remind one of acute disease treated by tartar emetic,

and tetanus itself has been successfully treated by large doses of this unfashionable salt.

Curare, which came from England, was first used in Italy by Vella in 1859. Two of his three cases were in the stage of asphyxia before he administered it; the third was unusually severe; all three were fatal. But Cassaignac (*Gaz. des Hôp.*) in the same year was successful. The drug, however, seems to have got a bad name, and has never recovered from it, in spite of the successful cases reported in 1873 by Stoffani, and in 1874 by Angelo Ghio and Carlo Lauri. In 1865 there is a report in the *Bull. de Thérap.* on curare which coincides with Eilert's summary in 1873. It is uncertain, always dangerous, and in most cases useless. Since it is the strongest of all our drugs as depressor of the motor nerves, and has no action on the spinal cord, the comparison of its effect with that of chloral is valuable. There does not seem to be any record of a trial of curare in combination with drugs that would supplement its action.

Belladonna, save that it excites the cord, is nearest in its action to curare. Gosselin, who failed with curare (*Gaz. des Hôp.*, 1860), failed with it also: and Benoit (*Bull. de Thérap.*, September, 1860), pushed it to intoxication and failed, not even relieving the stiffness of the muscles. On the other hand, Peschaux in the same year reported a successful case to the Surgical Society of Paris, having injected a solution of $\frac{1}{100}$ of atropine into different parts of the body; and Fournier (*Gaz. des Hôp.*, 1860), produced intoxication by subcutaneous injection, and saved his patient.

Strychnia, to which homœopathy would point, brought a strong recommendation from America; but Campbell de Morgan (*Brit. and For. Med. Chir. Rev.*, 59) tried it without finding it of any service. It increased, as one would suppose, the symptoms of tetanus, and put the patient in danger of death by asphyxia.

No special action has been made out for Cannabis Indica in tetanus; though used in large doses, it has failed in many cases, and has been unable to win any credit when the patient has recovered, and if one mentions this drug one should not omit alcohol, which has apparently been used successfully, and with effects that are worth recording. For Betoli (*Ann. Univ.*, 1859), who says that he kept his patient in a sort of drunkenness, affirms that the wits were strangely untouched, and that there

was neither headache nor giddiness. Mr. Williams too who prescribed at the rate of eight dozen of port a month, and Dr. Jlott, who administered two gallons of schnapps in a week, seem to have had nothing to regret.

Neurotomy, tenotomy and amputation are beyond the purpose of this paper, and for the consideration of the use of cold applications to the spine, sufficient materials seem to be wanting. Carpenter in the *New York Journal*, 1860 (this reference is not verified), states that he cured 16 out of 17 cases by this plan, and the ether spray to the back has been reported of use. The great difficulty of making use of this method is obviated by the use of chloral, which if given in sufficient doses might be generally relied on to render the patient tolerant of the treatment.

It has been the purpose of this short paper to sketch out briefly, with reference to a few selected instances, the history of the success and failure of these powerful drugs, in the belief that such a summary makes an appeal to pathology to throw fresh light on the nature of this disease ; for experiment, long on the track of discovery, seems now at fault, and asks for a better knowledge of the conditions to be met, not without a hope that some combination of these agents may be indicated which will perform what each one of them singly has been found unable to accomplish.

